



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/631,991	07/31/2003	Xiaodong Wang	02007 (16792)	2202

7590 03/08/2007  
Benjamin Lee  
NEC Laboratories America, Inc.  
4 Independence Way  
Princeton, NJ 08540

EXAMINER
----------

WANG, TED M

ART UNIT	PAPER NUMBER
----------	--------------

2611

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/08/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

## Office Action Summary

Application No.

10/631,991

Applicant(s)

WANG, XIAODONG

Examiner

Ted M. Wang

Art Unit

2611

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 19 December 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 2-13, 15-17 and 19-22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 21 and 22 is/are allowed.
- 6) ☒ Claim(s) 3, 9, 10, 12, 13, 15-17, 19 and 20 is/are rejected.
- 7) ☒ Claim(s) 2, 4-8 and 11 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Arguments***

1. The indicated allowability of claims 3, 9, 10, 13, 15-17, 19 and 20 are withdrawn in view of the newly discovered reference(s) to US 2004/0042556. Rejections based on the newly cited reference(s) follow.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 3, 9, 10, 12, 13, 15-17, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Medvedev et al. (US 2004/0042556) in view of Yang et al. (A sequential Monte Carlo blind receiver for OFDM systems in frequency-selective fading channels. IEEE Trans. Sig. Proc., 50(2):271-280, February 2002.).

- With regard claim 12, Medvedev et al. discloses a MIMO-OFDM system (Fig.3 element 310) for processing demodulating data (Fig.3 elements 354 and 360) comprising:

receiving values for symbols transmitted across the MIMO channel (Fig.3 element 300, MIMO-OFDM system and paragraph 103); and

estimating the received symbols by pre-multiplied or conditioned (paragraph 35).

Medvedev et al. discloses all of the subject matter as described in the above paragraph except for specifically teaching in accordance with the a priori probability values, determining a set of Monte Carlo samples of the symbols weighted with respect to a probability distribution of the symbols; and estimating a posteriori probability values for the symbols based on the set of Monte Carlo samples.

However, Yang et al. teaches a method for demodulating data from an OFDM channel (Abstract and page 271, right column, lines 16-22), comprising: receiving a priori probability values for symbols transmitted across the channel (Fig.3, Fig.5 element SMC detector input from symbol prob computer, page 276, section V, lines 1-17); and

in accordance with the a priori probability values, determining a set of Monte Carlo samples of the symbols weighted with respect to a probability distribution of the symbols (Fig.3 and 5, page 274, left column, lines 4-7, page 276, section V, lines 1-17 and page 277, left column, lines 4-7); and estimating a posteriori probability values for the symbols based on the set of Monte Carlo samples (Fig.3, Fig.5 element bit LLR computer, page 276, section V, lines 1-17, page 277, left column, line 8 – right column, before section VI).

It is desirable to have the blind sequential Monte Carol (SMC) detector in a coded OFDM system because it utilizes the a priori symbol probabilities, and it

produces the a posteriori symbol probabilities. In further, being both soft-input and soft-output in nature, the SMC detector and the MAP channel decoder can exchange the extrinsic information with each other to improve the receiver performance iteratively (page 276, section V, lines 1-17). Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention was made to implement the sequential SMC blind detector as taught by Yang et al into Medvedev's RX MIMO processor (Fig.3 element 360) so as to improve the receiver performance.

- With regard claim 3, the modified circuit of RX MIMO processor of Medvedev and Yang et al. further teaches wherein the Monte Carlo samples comprise stochastic Monte Carlo samples (page 271, right column, lines 1-9 and page 276, section V, lines 3-4).
- With regard claim 9, the modified circuit of RX MIMO processor of Medvedev and Yang et al. further teaches based on the a posteriori probability values, calculating a posteriori log-likelihood ratios of interleaved code bits (page 277, left column, line 8 –12).
- With regard claim 10, the modified circuit of RX MIMO processor of Medvedev and Yang et al. further teaches wherein the Monte Carlo samples comprise deterministic Monte Carlo samples (page 271, right column, lines 1-9 and page 276, section V, lines 3-4). Where, since the received stochastic Monte Carlo samples can be performed by the modified circuit of RX MIMO processor of Medvedev and Yang et al. properly, it is inherent that the modified circuit will

perform the deterministic Monte Carol symbol properly. Note that the difference between stochastic and deterministic is that one (stochastic) is a random process and the other is non-random.

- With regard claim 13, which is a program storage device tangibly embodying a program of instructions executable by a computer machine to program a method related to claim 12, all limitation is contained in claim 12. The explanation of all the limitation is already addressed in the above paragraph. Where Yang et al. teaches that the SMC detector as shown in Fig.5 implements the algorithm described in section IV-A (page 278, left column, lines 14-15) and executes by a computer (page 277, right column section VI, lines 1-4) for simulation. It is inherent that the algorithm (A computable set of steps to achieve a desired result) is been stored in a program storage device and been executed in a computer.
- With regard claim 15, which is a demodulator mean plus function related to claim 3, all limitation is contained in claim 3. The explanation of all the limitation is already addressed in the above paragraph.
- With regard claim 16, which is a demodulator mean plus function related to claim 10, all limitation is contained in claim 10. The explanation of all the limitation is already addressed in the above paragraph.
- With regard claim 17, which is a demodulator mean plus function related to claim 12, all limitation is contained in claim 12. The explanation of all the limitation is already addressed in the above paragraph.

Art Unit: 2611

- With regard claim 20, which is a receiver claim related to claim 12, the modified circuit of RX MIMO processor of Medvedev and Yang et al. with the SMT blind decoder further teaches
  - a soft outer channel decoder (Fig.5 element channel decoder, page 276, section V, lines 14-17);
  - a soft inner demodulator (Fig.5 element SMC detector and page 278, right column, lines 12-14); and
  - a symbol probability computer (Fig.5 element symbol prob computer).
- All other limitation is contained in claim 12. The explanation of all the limitation is already addressed in the above paragraph.
- With regard claim 19, which is a receiver claim related to claim 9, all limitation is contained in claim 9. The explanation of all the limitation is already addressed in the above paragraph.

***Allowable Subject Matter***

4. Claims 21 and 22 are allowed.
5. Claims 2, 4-8 and 11 are objected to as being dependent upon an objected claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
6. The following is an examiner's statement of reasons for allowance.
  - The prior art fails to teach an apparatus of Claims 21 and 22 that specifically comprises the following:

-- The instant application is deemed to be directed to a non-obvious improvement over the admitted prior art of the instant application and the PGPUB No. US 2002/0034261, US 2004/0042556 and Yang et al. (A sequential Monte Carlo blind receiver for OFDM systems in frequency-selective fading channels. IEEE Trans. Sig. Proc., 50(2):271-280, February 2002.). The improvement comprises that

With regard claims 21 and 22, "(b1) calculating an exact expression for the probability distribution by enumerating m samples for less than all transmit antennas to obtain m data sequences, where m is a number of the deterministic Monte Carlo samples determined for the symbol interval;  
(b2) computing the importance weight  $w_k^{(i)}$  for each symbol  $s_k^{(i)}$ , where k is an index identifying a transmit antenna; and (b3) selecting and preserving m distinct data sequences with the highest weights;" as recited in combination with other limitation as claimed.

### ***Conclusion***

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ted M. Wang whose telephone number is 571-272-3053. The examiner can normally be reached on M-F, 7:30 AM to 5:00 PM.

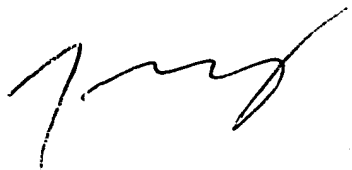
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on 571-272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Art Unit: 2611

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Ted M. Wang

A handwritten signature in black ink, appearing to be 'Ted M. Wang', written in a cursive style.

Ted M Wang  
Examiner  
Art Unit 2611